Sandia National Laboratories / New Mexico

PROPOSAL FOR NO FURTHER ACTION ENVIRONMENTAL RESTORATION PROJECT SITE 48, BUILDING 904 SEPTIC SYSTEM (TA II) OPERABLE UNIT 1303

June 1995

Environmental Restoration Project

United States Department of Energy
Albuquerque Operations Office

PROPOSAL FOR NO FURTHER ACTION

Site 48, Building 904 Septic System (Technical Area II)
Operable Unit 1303

SANDIA NATIONAL LABORATORIES/NEW MEXICO

1. Introduction

1.1 ER Site Identification Number and Name

Sandia National Laboratories/New Mexico (SNL/NM) is proposing an administrative no further action (NFA) decision based on confirmatory sampling for Environmental Restoration (ER) Site 48, Building 904 Septic System, Operable Unit (OU) 1303. The Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) grouped all septic tanks and leachfields found throughout Technical Area (TA) II, III and V together. The Building 904 Septic System and all other associated systems were given RFA number 79 Environmental Protection Agency (EPA 1987). ER Site 48 was identified as the Building 904 Septic System in the Hazardous and Solid Waste Amendment (HSWA) Module IV (EPA 1993) of the SNL/NM RCRA Hazardous Waste Management Facility Permit (NM5890110518) (EPA 1992).

1.2 SNL/NM Administrative NFA Based on Confirmatory Sampling Process

This proposal for a determination of an administrative NFA decision based on confirmatory sampling has been prepared using the criteria presented in Section 4.5.3. of the SNL/NM Program Implementation Plan (PIP) (SNL/NM 1995). Specifically, this proposal "contains information demonstrating that there are no releases of hazardous waste (including hazardous constituents) from solid waste management units (SWMU) at the facility that may pose a threat to human health or the environment" [as proposed in the Code of Federal Regulations (CFR) Section 40 Part 264.51(a)(2)] (EPA 1990). The HSWA Module IV contains the same requirements for an NFA demonstration:

> Based on the results of the RFI (RCRA Facility Investigation) and other relevant information, the Permittee may submit an application to the Administrative Authority for a Class III permit modification under 40 CFR 270.42(c) to terminate the RFI/CMS (corrective measures study) process for a specific unit. This permit modification application must contain information demonstrating that there are no releases of hazardous waste including hazardous constituents from a particular SWMU at the facility that pose threats to human health and/or the environment, as well as additional information required in 40 CFR 270.42(c) (EPA 1993).

In requesting an administrative NFA decision based on confirmatory sampling for ER Site 48, Building 904 Septic System, this proposal is using existing administrative/archival information to satisfy permit requirements. This unit is eligible for an administrative with confirmatory sampling NFA proposal based on one or more of the following criteria taken from the RCRA Facility Assessment Guidance (EPA 1986):

Criterion A: The unit has never contained constituents of concern

Criterion B: The unit has design and/or operating characteristics that effectively prevent releases to the environment

Criterion C: The unit clearly has not released hazardous waste or constituents into the environment

Specifically, ER Site 48 is being proposed for an administrative NFA decision based on confirmatory sampling because the SWMU clearly has not released hazardous waste or constituents into the environment (Criterion C).

1.3 Local Setting

SNL/NM occupies 2,829 acres of land owned by the Department of Energy (DOE), with an additional 14,920 acres of land provided by land-use permits with Kirtland Air Force Base (KAFB), the United States Forest Service (USFS), the State of New Mexico, and the Isleta Indian Reservation. SNL/NM has been involved in nuclear weapons research, component development, assembly, testing, and other nuclear activities since 1945.

ER Site 48 (Figure 1) is owned by DOE. The site is located in the central to south-central portion of TA-II. TA-II, one of five technical areas within SNL/NM, is diamond-shaped, approximately 1,450 feet on a side, and encompasses 45 acres. The center of TA-II is approximately 3,000 feet south of TA-I, the location for most administrative and research activities, and TA-II abuts TA-IV to the south. TA-II is surrounded by a 10-feet high chain link fence, with a security guarded gate at the west corner. In earlier years, guard towers were located at each corner; now only the west entrance tower remains. TA-II currently contains 22 buildings, 27 high explosives (HE) bunkers of various sizes, and four mobile offices (MOs).

TA-II lies west of the basin-bounding fault complex and northwest of the Tijeras Arroyo fault, which are the two main structural features of the Albuquerque Basin. The geologic materials consist of thick alluvial sediments which overlie deep bedrock. An alluvial fan and piedmont colluvium overlie Santa Fe Group strata. The Santa Fe deposits are estimated to be approximately 3,000 feet thick beneath TA-II (Hawley and Haase 1992). Detailed descriptions of the regional geology are in the PIP and in the annual Site-Wide Hydrogeologic Characterization Project (SWHCP) 1993 Annual Report (SNL/NM 1993).

Previous SWHCP soil surveys and 1993 surficial mapping activities provide general soil characteristics for TA-II. Soil associated with the escarpments of the Tijeras Arroyo is poorly developed, such as the Bluepoint-Kokan Association (Hacker 1977). Areas underlain by this soil series, however, locally contain well-developed calcic horizons, which are the remnants of the Tijeras, Wink, and Madurez soil originally developed on older surficial deposits. The Bluepoint-Kokan soil reflects erosion of older soil and, therefore, is characterized by discontinuous soil horizons. The heterogeneity would be expected to strongly influence the location and rates of infiltration and geochemical interactions between soil and percolating water (SNL/NM 1993). TA-II is characterized as having an average surface soil permeability of approximately 0.1 inch per hour (SNL/NM 1993).

No perennial surface-water bodies are present within TA-II or in the immediate vicinity of the area. However, a large ephemeral surface drainage, the Tijeras Arroyo, is located directly southeast of TA-II. TA-II is located outside the 100- and 500-year floodplains of the Tijeras Arroyo.

Depth to regional ground water in the vicinity of TA-II is approximately 540 feet, with shallower water-bearing units present at approximately 305 to 315 feet. In the shallower saturated zones, the ground water gradient is to the south-southeast at 0.016 foot per foot (ft/ft). No water supply wells are present within TA-II.

2. History of the SWMU

2.1 Sources of Supporting Information

In preparation to request an administrative NFA decision based on confirmatory sampling for ER site 48, a background study was conducted to collect available and relevant site information. Background information sources included existing records and reports of site activity. In addition, interviews were conducted with SNL/NM staff and contractors familiar with site operational history. The study was completely documented and has provided traceable references which sustain the integrity of this proposal.

The following information sources were available for use in the evaluation of ER site 48:

- Interviews were combined and summarized in three reports (Anonymous no date; Haines, Kelly, and Cochran 1991; and Byrd 1991).
- Radiation and organic vapor surveys were performed over the sanitary and the HE drain trench areas. Soil samples were collected from three horizons from two trench sample locations.
- The Site-Wide Hydrogeologic Characterization Project 1993 Annual Report (SNL/NM 1993).
- Sequential historical aerial photographs from 1951 to 1992 for the specifically prescribed area of ER Site 48 (Ebert 1994).
- Two passive soil vapor surveys (SVS) were conducted in portions of the Building 904 sanitary septic system leachfield and HE drain trench areas [Northeast Research Institute (NERI 1994)].
- Two boreholes were drilled and soil samples were collected near Building 904. One was drilled along the sanitary sewerline where the seepage pit connects to the drainlines. The other was drilled along the HE drainline near the HE catch box.

Utilizing this information, a brief history of ER Site 48 and a discussion of all relevant evidence regarding past waste practices and releases at the site have been prepared and are presented in this proposal for an administrative NFA decision based on confirmatory sampling.

2.2 Previous Audits, Inspections, and Findings

The RCRA RFA grouped all septic tanks and leachfields found throughout TA-II, III, and V together. The Building 904 septic system and all associated systems were given RFA number 79 (EPA 1987). The Building 904 Septic System was listed as a SWMU because sanitary wastes were not separated from industrial wastes; therefore, hazardous wastes may have been discharged to septic tanks and leach fields. This SWMU includes both the Building 904 sanitary and HE septic lines.

The 1987 RCRA RFA is summarized below.

The wastes managed at this location included sanitary and industrial wastes, including trichloroethylene (TCE), toluene, and methanol. Septic tank contents were discharged to leach fields. Release controls did not appear to have been present. There is no history of releases at this location. The potential for air contamination resulting from ER Site 48 is low because the wastes were discharged to underground septic tanks, then to leachfields. The potential for soil contamination is high because the wastes were released to leachfields. The potential for surface and ground water contamination was not determined in the RFA. Because sanitary wastes were disposed in tanks and leached through surface soils, there is a potential for subsurface gas generation.

The 1987 Comprehensive Environmental Assessment and Response Program (CEARP) Phase 1 (DOE 1987) is summarized below.

Industrial and sanitary wastes from the TA-II buildings were discharged through a system of septic tanks and drainfields. Buildings 904 and 907 (TA-II) were formerly used for weapon assembly and high-explosives development and processing work. The buildings' drain systems may be contaminated with high explosives and solvents from process washdown (Site 48). The floor drains in these buildings emptied to the septic system through a trap containing burlap bags. High explosives retained in the burlap were burned in a pit. There was a Comprehensive Environmental Response, Compensation, and Liablilty Act (CERCLA) finding of Uncertain for Federal Facility Site Discovery and Identification Findings (FFSDIF), Preliminary Assessment (PA), and Preliminary Site inspection (PSI); insufficient information is available to calculate a hazard ranking system (HRS) migration mode score.

2.3 Historical Operations

Building 904, currently the Environmental Testing Laboratory, was constructed in 1947 and is located in the south-central portion of TA-II (Figure 1), about 500 feet northwest of the incised Tijeras Arroyo. Building 904 contains about 10,415 square feet. It was initially designed for the production and assembly of nuclear weapons. An earthen berm was built on

the north side of the building to isolate the building from surrounding areas from potential accidental explosions.

During nuclear weapons assembly operations in the early 1950s, 8 to 10 employees worked three eight-hour shifts per day. During assembly work, HE blocks were shaved or machined to fit into the nuclear weapons. Liquid HE was occasionally used to fill cracks in the HE components during weapons assembly. During the assembly operations, compacted HE may have been occasionally dropped, but sweeping was not permitted in the building because it could potentially generate static electricity. Therefore, floor debris and explosives materials, including Baratol, Compound B, and black powder, were flushed down the assembly bay floor drain with large quantities of water and discharged into the HE drain system. The assembly bays were washed down daily, possibly with a mixture of kerosene and water. The floor drains appear to have been designed to discharge large volumes of water and may have received significant amounts of water containing kerosene and small amounts of explosives materials.

Between 1948 and 1951, weapons assembly work areas and equipment were typically cleaned with carbon tetrachloride. The carbon tetrachloride was used liberally (up to 3 gallons a month) until about 1951, when it was replaced with trichloroethylene (TCE) because the carbon tetrachloride vapors caused headaches. The TCE was reportedly "used like water" for cleaning and employees opened the building doors for ventilation.

In the middle-to-late 1950s, nuclear weapons assembly operations were discontinued and the building was converted into an explosives testing and development facility; an HE chemistry laboratory also was added. Chemicals used in the laboratory may have included methyl ethyl ketone (MEK), acetone, carbon tetrachloride, hexane, xylene, freon compounds, toluene, alcohols, TCE, and methylene chloride. The explosives testing and development operations involved mixing small quantities of explosives in separate handling areas. Residues were not flushed down the floor drains; however, small amounts of cleaning solvents may have been discharged to the sanitary system after cleaning explosives testing devices. Components were typically cleaned with toluene, petroleum distillates, isopropyl alcohol, nitromethane, acetone, and methanol.

Since about 1968, Building 904 has been used as an environmental and functional testing laboratory for weapons components. In 1969, Building 904 was enlarged with the addition of a darkroom for processing X-ray film. Photodevelopment solutions, which may have contained cadmium, silver, chromium, and cyanide, may have been discharged to the Building 904 septic drain system.

During the 1970s, an explosives shock test facility also was located in the building, and in 1975, several rooms were converted for nuclear materials safeguards and security research with chemical deterrents using foams and smokes. Some organic solvents and cleaning agents also were used, including acetone, methylene chloride, ammonium hydroxide, and titanium tetrachloride.

To summarize, contaminants that could have been discharged into the septic system from the sanitary and HE drain systems include:

- Solvents including acetone, methylene chloride, TCE, MEK, carbon tetrachloride, toluene, xylene, hexane, and alcohols
- HE compounds
- Inorganic contaminants, including ammonium hydroxide, barium, cadmium, silver, chromium, titanium, and cyanide

3. Evaluation of Relevant Evidence

3.1 Unit Characteristics

Building 904 was constructed with two drain systems: a sanitary system and an HE system (Figure 2). The systems encompass 950 feet of drainlines.

The HE system was constructed to drain the assembly bays and extends about 325 feet south from Building 904 to a catch box that collected HE particulates by filtration of the discharge water. The top of the catch box is 5 feet below ground level (BGL). From the catch box, the HE system extends an additional 200 feet east-southeast (Figure 1) and discharged onto the bank of the Tijeras Arroyo. Where it emptied into Tijeras Arroyo, the HE drainline has been designated as ER Site 227, ADS 1309/Tijeras Arroyo. This outfall site is being evaluated as part of the investigations of Tijeras Arroyo.

The sanitary system extends 120 feet west from the northwest corner of Building 904 and consists of a 900-gallon septic tank, a 5-foot-diameter by 8.5-foot-deep seepage pit, and 150 feet of drainage pipe. The bottom of the leachfield is about 14 feet BGL. Floor drains and clean outs were located in each room in Building 904, including the HE assembly and packaging rooms. The floor drains, hood drains, and sinks may have been cross-connected between the sanitary system and the HE system due to remodeling over the years. The floor drains also may have been connected to the sink and fume hood drain in the laboratory.

3.2 Operating Practices

To reduce the potential for HE introduction into the environment, the HE collected in the catch box were removed periodically and were burned at the Explosive Burn Pit area, ER Site 114.

3.3 Presence or Absence of Visual Evidence

ER Site 48 is located underground; thus, no visual evidence was obtained to determine that environmental contamination has not originated from this site.

3.4 Results of Previous Sampling/Surveys

On December 5 and 6, 1991, radiation and organic vapor surveys were performed over the sanitary sewerline and the HE drain trench areas. The organic vapor survey was performed using an HNu photoionization detector (PID) held at waist height, field calibrated to read equivalent benzene concentration. No readings were detected above background levels. The radiation survey was performed using a Bicron 2000 gamma detector held at waist height, and an ASP-1 survey meter with an HP-260 G-M pancake probe held at ground level for beta-gamma detection. The objectives of the survey were to determine both the general area gamma radiation levels and the presence of surface contamination. The radiation levels varied from approximately 0.02 to 0.03 milliroentgens per hour (mR/hr). Surface readings varied from approximately 80 to 140 counts per minute (cpm), which are within the range of area background activities. Several swipe surveys also were performed on the ground and personnel were monitored for contamination. No elevated activities were identified compared to background.

Changes in vegetation that appeared to be related to septic line discharge were identified through the interpretation and digital mapping of vegetation from sequential historical aerial photographs for the specifically prescribed area of ER Site 48 (Ebert 1994). Vegetation appears to have been affected along both the sanitary and HE septic lines between 1964 and 1992.

On November 1, 1993, soil samples were collected from three horizons at trench sample locations 5 and 7 (Figure 2). Soil samples were collected at the surface, at 2 feet BGL, and at 3.5 feet BGL at each trench location. The 2-foot and 3.5-foot deep samples were collected above the septic pipe and immediately below the pipe, respectively. The soil samples were analyzed for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs), HE compounds, metals, tritium, and radioisotopes. No constituents of concern were detected in the samples above SNL/NM site-wide calculated upper tolerance limit (UTL) background concentrations (IT 1994) or activities and/or above proposed RCRA Subpart S action levels except copper. Copper had a maximum concentration of 52.7 milligrams per kilogram (mg/kg) at trench 7. The UTL for copper is 16.74 mg/kg. No proposed action level was calculated because copper is an important essential element.

The raw data, along with quality assurance/quality control (QA/QC) documentation, are readily available and can be viewed in the Environmental Operations (EO) Records Center. A summary of the data is presented in Table 1 and includes the maximum concentrations of the constituents of concern, the site-wide UTL background concentrations, and the proposed RCRA Subpart S action levels as appropriate and available.

3.5 Assessment of Gaps in Information

Identified data gaps required that a more comprehensive investigation of VOCs and SVOCs in the close vicinity of the septic system leachfield and the HE drain trench areas be accomplished by a soil vapor survey (SVS). This more comprehensive investigation was needed to locate and qualify the nature and extent of potential organic contamination. Location-specific soil sampling and analysis for organics, inorganics, HE, and radioisotopes

were deemed necessary along the septic pipes, at the seepage pit, and HE catch box to provide supplementary confirmation of the soil gas survey results and to quantify contamination at potential source areas.

3.6 Confirmatory Sampling

Two investigations were determined necessary to fill the data gaps (see Section 3.5). The results for the investigations are presented below. The Sampling and Analysis Plan (SAP) for the borehole investigation is included in Appendix A. The raw data, along with QA/QC documentation, are readily available and can be viewed in the EO Records Center. A summary of the borehole data is presented in Table 2 and includes the maximum concentrations of the constituents of concern, the site-wide UTL background concentrations, and the proposed RCRA Subpart S action levels as appropriate and available.

From November 11 to December 3, 1993, and from January 21 to February 11, 1994, two passive SVS investigations were conducted in portions of the Building 904 sanitary septic system leachfield and HE drain trench areas. Except for low levels of benzene, toluene, ethylbenzene and xylene (BTEX) and one isolated detection of tetrachloroethene (PCE), no other VOCs or SVOCs were identified from the SVS investigations. The BTEX and PCE levels are considered low and probably do not reflect contamination in the leachfield area (NERI 1994). In support of this conclusion, no BTEX or other VOCs were detected in the trench samples described previously or the borehole soil samples discussed below. A copy of the 1994 NERI report has been included as a separate report with the submittal of this NFA proposal.

On November 3 and 8, 1994, Boreholes TA2-BH-06 and TA2-BH-07 were drilled near Building 904 (Figure 2). Borehole TA2-BH-06 was drilled along the sanitary sewerline where the seepage pit connects to the drainlines. Borehole TA2-BH-07 was drilled along the HE drainline near the HE catch box. Soil samples were collected from each borehole at approximate depths of 5, 10, 15, 20, 30, 40, and 50 feet BGL. The soil samples were analyzed at off-site laboratories for VOCs, SVOCs, HE, total metals, cyanide, tritium, and gamma spectroscopy.

No VOCs, SVOCs, or HE compounds were identified above instrument detection limits. The only metal which exceeded an SNL/NM site-wide UTL background concentration was barium, UTL = 407.9 mg/kg (IT 1994), which was detected at a maximum of 509 mg/kg (11.5-foot depth) in Borehole TA2-BH-07, and is less than the proposed RCRA Subpart S action level value of 6000 mg/kg. Radiological data show no elevated activities compared to background.

Site-wide UTL background concentrations were not calculated for arsenic, cyanide, thallium, or vanadium. However, proposed RCRA Subpart S action levels were available. Arsenic was identified at a maximum concentration of 3.7 mg/kg (11.5-foot depth) in Borehole TA2-BH-07, less than the proposed RCRA Subpart S action level of 20 mg/kg. Cyanide was identified at a maximum concentration of .64 mg/kg (51-foot depth) in Borehole TA2-BH-07, less than the proposed RCRA Subpart S action level of 2,000 mg/kg. Thallium was identified at a maximum concentration of 1.1 mg/kg (21-foot depth) in Borehole TA2-BH-07, less than the proposed RCRA Subpart S action level of 6.92 mg/kg. Vanadium was identified at a

maximum concentration of 27.3 mg/kg (30-foot depth) in Borehole TA2-BH-06, less than the proposed RCRA Subpart S action level of 600 mg/kg.

3.7 Rationale for Pursuing a Confirmatory Sampling NFA Decision

A comparison of analytical results to SNL/NM background levels and proposed RCRA Subpart S action levels shows that all chemical constituents of concern are either within background concentration levels and/or below the prescribed action level. The results of the organic vapor survey, soil vapor survey, and soil sample analysis indicate no hazardous constituents exist at this site that may pose a threat to human health and/or the environment.

4. Conclusion

ER Site 48 is being proposed for an administrative NFA decision based on confirmatory sampling because the evidence cited above demonstrates that the SWMU clearly has not released hazardous wastes or constituents into the environment (Criterion C) (see Section 1.2). Therefore, no threat to human health or the environment exists.

5. References

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U.S. Environmental Protection Agency (EPA), 1993. Module IV of RCRA Permit No. NM 58901105189. EPA Region VI, issued to Sandia National Laboratories, Albuquerque, New Mexico.

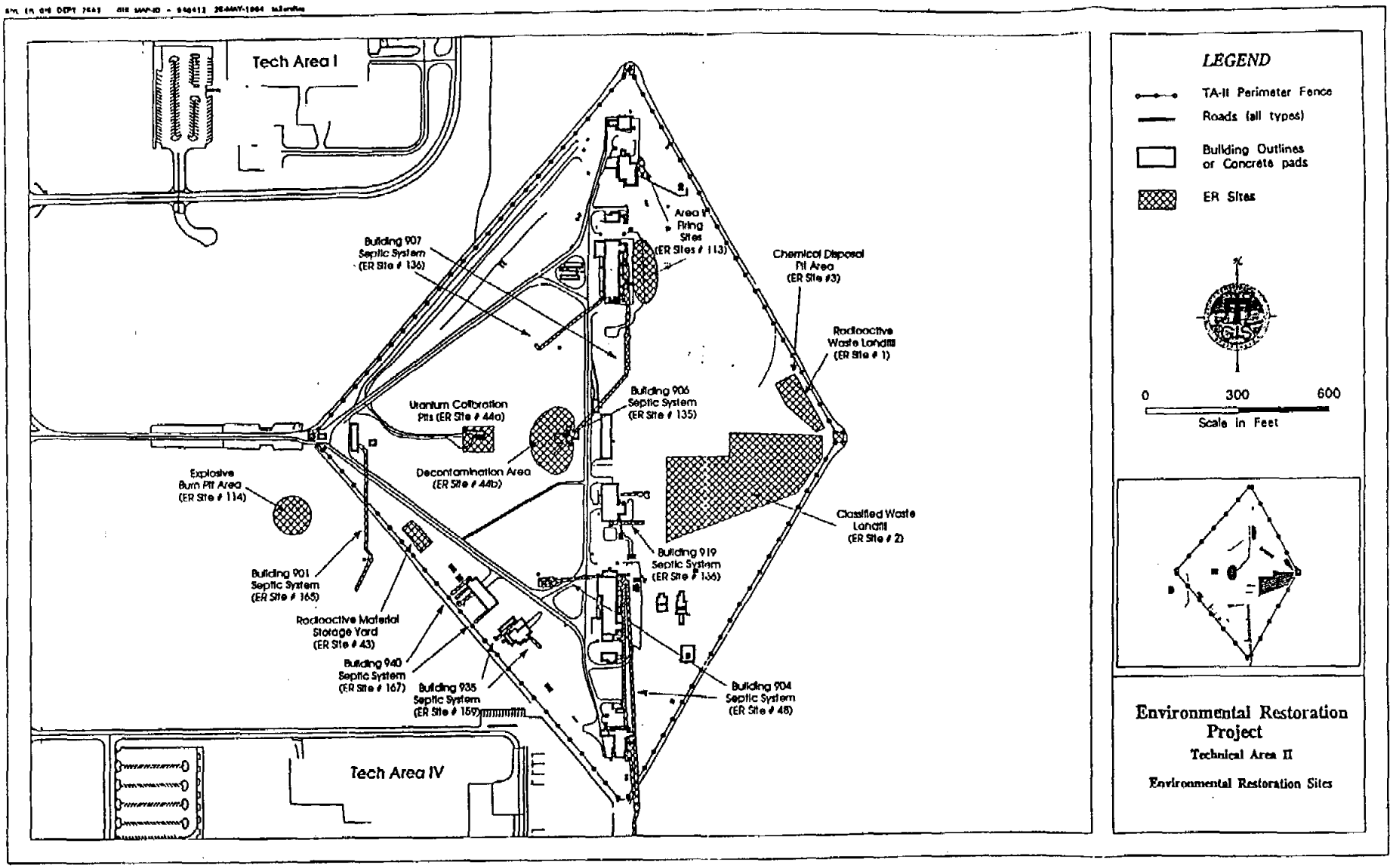

Figure 1. Technical Area II and the Locations of Environmental Restoration Sites.

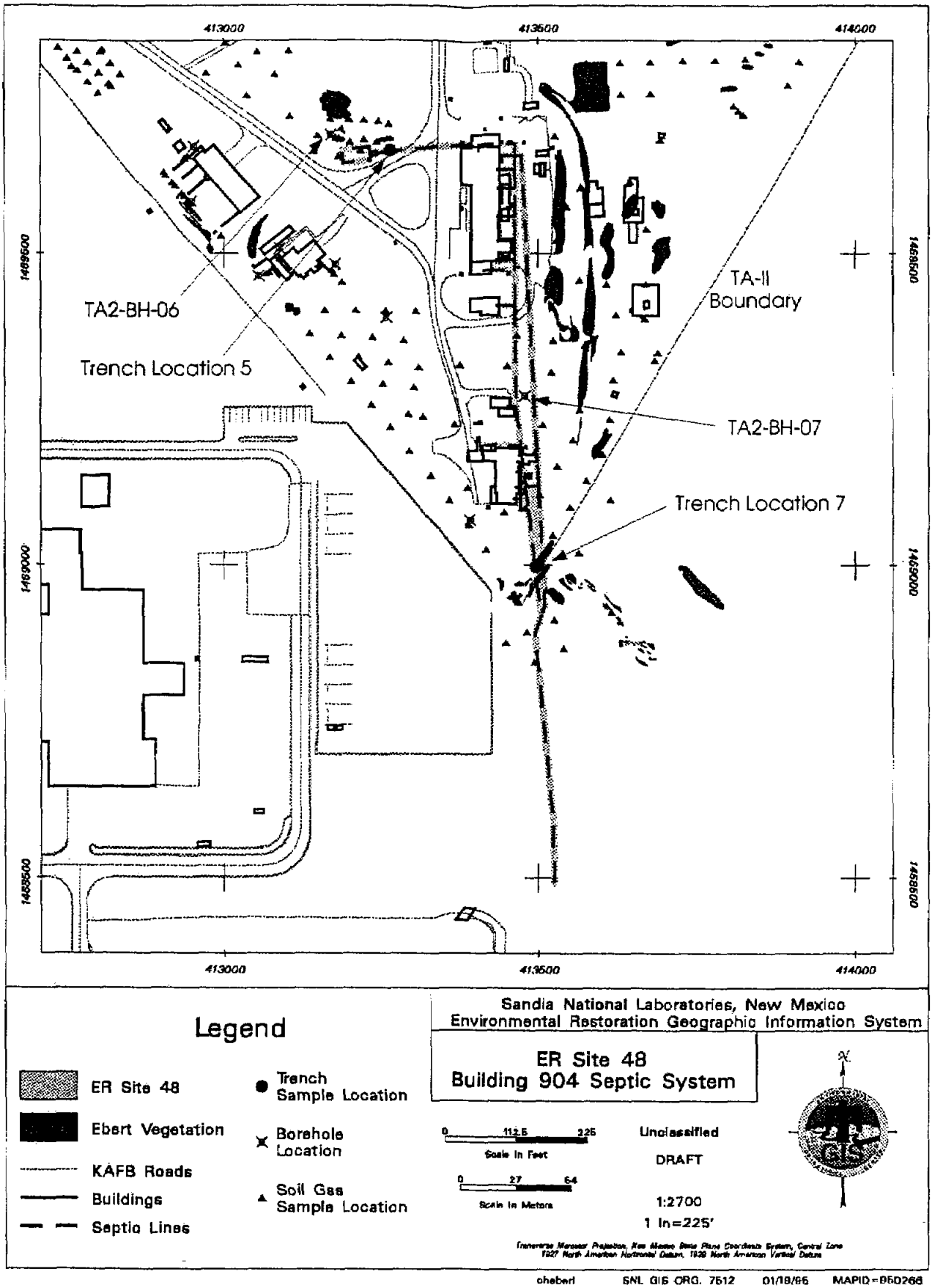

Figure 2. Map Showing ER Site 48 Building 904 Septic System

Table 1. Site 48, Building 904 Septic System, Data Summary of Soil Samples Collected from Trenches 5 and 7

Parameter	Trench 5 maximum concen. mg/kg-mtls ug/kg-org.	Trench 7 maximum concen. mg/kg-mtls ug/kg-org.	Site-wide UTL background concen. mg/kg-mtls ug/kg-org.	Sandia proposed RCRA Subpart S Action Level mg/kg-mtls ug/kg-org.
Antimony	ND	ND	NC	30
Arsenic	2.1	2.9	NC	20
Barium	123	119	407.9	6,000
Beryllium	.31	.44	.8	.2
Cadmium	ND	.56	3.5	80
Chromium	5.2	12.8	22.9	80,000
Cobalt	4.0	6.1	21[a]	NC
Copper	9.1	52.7	16.7	NC
Lead	11.6	12.8	15	NC
Mercury	ND	.80	NC	20
Nickel	5.3	5.8	15.4	2,000
Selenium	ND	ND	NC	400
Silver	ND	8.7	4.0	400
Thallium	ND	ND	NC	6.92
Vanadium	19.8	41.8	NC	600
Zinc	28.4	215	46.7	20,000
Acetone	15B	ND	NC	8,000
Carbon Tetra-chloride	ND	ND	NC	5

Table 1. Site 48, Building 904 Septic System, Data Summary of Soil Samples Collected from Trenches 5 and 7 (Concluded)

Parameter	Trench 5 maximum concen. mg/kg-mtls ug/kg-org.	Trench 7 maximum concen. mg/kg-mtls ug/kg-org.	Site-wide UTL background concen. mg/kg-mtls ug/kg-org.	Sandia proposed RCRA Subpart S Action Level mg/kg-mtls ug/kg-org.
Methyl ethyl ketone	ND	110	NC	50,000
Methylene chloride	69B	21B	NC	90
Tetrachloro-ethene	5.3	5.2	NC	10
Trichloro-ethene	5.6	ND	NC	60
Toluene	9.1	10	NC	20,000
Xylene	8.8	8.9	NC	200,000
HMX	ND	ND	NC	NC
RDX	ND	ND	NC	NC

Notes

ND = Not detected.
N/A = Not applicable.
NC = Not calculated.
B = Parameter detected in blank
a = A site-wide UTL was not calculated for cobalt. However, a UTL was calculated for the Tijeras Arroyo sites which are adjacent to TA-II. The UTL for Tijeras Arroyo was used in this NFA proposal.

Aluminum, calcium, iron, magnesium, manganese, potassium and sodium were excluded from the table due to natural abundance.

Table 2. Site 48, Building 904 Septic System, Data Summary of Soil Samples Collected from Borehole 06 and Borehole 07

Parameter	BH-06 max. concen. mg/kg-metals ug/kg-organic	Depth	BH-07 max. concen. mg/kg-metals ug/kg-organic	Depth	Site-Wide UTL backgnd concen. mg/kg-metals ug/kg-organic	Sandia RCRA Subpart S Action Level mg/kg-metals ug/kg-organic
Antimony	ND	N/A	ND	N/A	NC	30
Arsenic	3.5	10	3.7	11.5	NC	20
Barium	145	10	509	11.5	407.9	6,000
Beryllium	.55	30	.42	21	.8	.2
Cadmium	ND	N/A	ND	N/A	3.5	80
Chromium	9.9	30	9.6	51	22.9	80,000
Cobalt	5.5	30	6.6	51	21[a]	NC
Copper	15.1	30	10.9	51	16.7	NC
Cyanide	ND	N/A	.64	51	NC	2,000
Lead	5.1	30	6.3	51	15	NC
Mercury	ND	N/A	ND	N/A	NC	20
Nickel	9.5	30	11.3	21	15.4	2,000
Selenium	ND	N/A	ND	N/A	NC	400
Silver	ND	N/A	ND	N/A	4.0	400
Thallium	ND	N/A	1.1	21	NC	6.92
Vanadium	27.3	30	25.9	21	NC	600
Zinc	36.6	30	44.2	51	46.7	20,000

Table 2. Site 48, Building 904 Septic System, Data Summary of Soil Samples Collected from Borehole 06 and Borehole 07 (Concluded)

Parameter	BH-06 max. concen. mg/kg-metals ug/kg-organic	Depth	BH-07 max. concen. mg/kg-metals ug/kg-organic	Depth	Site-Wide UTL backgnd concen. mg/kg-metals ug/kg-organic	Sandia RCRA Subpart S Action Level mg/kg-metals ug/kg-organic
all organics	ND	N/A	ND	N/A	NC	NC
HMX	ND	N/A	ND	N/A	NC	NC
RDX	ND	N/A	ND	N/A	NC	NC

Notes

ND = Not detected.
N/A = Not applicable.
NC = Not calculated.
a = A site-wide UTL was not calculated for cobalt. However, a UTL was calculated for the the Tijeras Arroyo sites which are adjacent to TA-II. The UTL for Tijeras Arroyo was used in this NFA proposal.

Aluminum, calcium, iron, magnesium, manganese, potassium and sodium were excluded from the table due to natural abundance.

APPENDIX A

Confirmatory Sampling and Analysis Plan

Workplan for Drilling at Technical Area 2

Introduction

Beginning on about Tuesday, November 1, 1994 (time is approximate; assumes all drilling contracts are in place), drilling will be conducted at several locations within Technical Area II (TA-II) to collect data in support of the DOE-approved TA-II RFI Workplan and no further action (NFA) proposals. The scope of work will be divided into two phases. Phase I involves drilling 25 boreholes in TA-II ranging in depths from 30 to about 125 ft below ground level (BGL). The majority of the boreholes will be drilled to 50 ft. Phase II will involve drilling up to 2 boreholes to first water and completing them as monitor wells. This mini-Workplan only presents work and sampling and analysis (SAP) tables for Phase I. Phase II work details will be presented at a later date. All Phase I boreholes probably will be drilled with hollow stem augers and samples will be collected in split-spoon samplers lined with stainless steel liners (as done in the March 1994 drilling at Technical Area II). Phase I drilling will probably be conducted with an F-10, Mobile B-61, or a CME-75 or -95 drill rig (depending upon availability). Installation of the Phase II monitor wells will be determined after the results of the Phase I drilling, but may involve wireline coring using air or air-mist. During Phase I, continuous core will not be collected; the lithology at each borehole will be described from split-spoon samples and drill cuttings. All angled boreholes probably will be drilled with hollow stem augers, but other methods also will be evaluated.

The scope of work for Phase I drilling will involve:

Non-Landfill Portions of TA-II

- Drilling and sampling two boreholes to 50 ft BGL at Building 904 (one at the septic leachfield and one along the high explosives [HE] catch box);
- Drilling and sampling two boreholes to 50 ft BGL at Building 907 (one at the septic leachfield and one along the HE catch box);
- Drilling and sampling three boreholes in the vicinity of Building 935 (two 50-ft boreholes, one downgradient from the former retention tank and dry well locations and one adjacent to the septic tank; and one 30-ft borehole

east of the septic tank in a high trichloroethene [TCE] soil vapor survey [SVS] location);

- Drilling and sampling two boreholes to 50 ft BGL at Building 940 (one near the septic tank and one near the dry well);
- Drilling and sampling one borehole to 50 ft BGL west of Buildings 915 and 922 (at a high benzene-toluene-ethylbenzene-xylene [BTEX] SVS location in the vicinity of the septic tank);
- Drilling and sampling one borehole to 100 ft BGL southwest of Building 913 (at the highest TCE SVS location in TA-II); and
- Drilling and sampling two boreholes to 50 ft BGL east of Building 919 (one in the septic leachfield and one near the seepage pit).

Thus, thirteen boreholes will be drilled and sampled in non-landfill portions of TA-II. Phase I also will involve:

Eastern Portion of TA-II (Landfill Areas)

- Drilling and sampling four angled boreholes to a maximum of about 95 ft BGL beneath the Radioactive Waste Landfill (RWL) and one 30-ft deep borehole at the former Chemical Disposal Pit (CDP) outside of, and adjacent to, the RWL fence; and
- Drilling and sampling two angled boreholes to about 95 ft BGL beneath the Classified Waste Landfill (CWL) and five 50-ft boreholes, one at each American Car and Foundry (ACF) pit and/or cut-and-fill trench within the CWL.

Thus, six angled boreholes and 6 non-angled boreholes will be drilled and sampled in the landfill portions of TA-II (i.e., eastern portion of TA-II). A total of twenty-five boreholes will be drilled throughout TA-II as part of the Phase I drilling activities.

In addition to drilling and sampling boreholes during Phase I, surface and near-surface soil samples also will be collected from the vicinity of Building 935. The scope of work for this sampling event will involve:

- Collecting 13 surface (0 to 0.5 ft deep) and 13 near-surface (3 to 5 ft deep) soil samples in the immediate vicinity of Building 935 (Table to be added later).

The purposes of the Phase I work are to:

- Drill and sample boreholes in the vicinity of Environmental Restoration (ER) sites in support of the DOE-approved RFI Workplan and NFA proposals;
- Determine if any potential contaminants are present in soil near the ACF pits and/or trenches and beneath part of the CWL;
- Determine concentrations of TCE in soil in the vicinity of Buildings 913 and 935; and
- Justify no further action (NFA) proposals for the 5 septic system ER sites, if appropriate.

The scope of work for Phase II will involve:

- Installing up to 3 deep boreholes within TA-II and completing them as monitor wells. One of the three boreholes drilled in the CWL last March may be advanced to the first water-bearing zone at approximately 330 ft BGL. The other two boreholes will be installed at the apexes of TA-II: one at the northern apex, possibly near Building 915, and one at the southern apex, possibly near Building 913. Both of these also will be installed in the first water-bearing zone at about 330 ft BGL; and
- Conducting geophysical logging at each potential well location.

The drilling method(s) for the Phase II monitor wells will be determined from the results of the Phase I investigation and from the availability of drill rigs.

The purposes of Phase II are to:

- Determine if ground water has been impacted by potential contaminants in soil in the vicinity of the CWL and Building 913; and
- Determine if the ground water flow direction and gradient are consistent throughout TA-II.

Geophysical logs (e.g., neutron, caliper, density, EMI) will be performed prior to installing each monitor well to confirm the location of the first water-bearing zone and evaluate the integrity of the borehole for well completion.

Project Personnel

A site-specific Health and Safety Plan (HASP) has been developed and approved by DOE and Sandia Health and Safety as part of the TA-II Workplan for the planned RFI fieldwork activities at TA-II. The Technical Task Leader for the drilling activities is Rarilee Conway of Department 7582. A designated Site Safety Officer (SSO) will be on-site for all drilling activities at TA-II. A contractor technician will conduct all field screening for volatile organic compound (VOC) vapors and radiosiotopes, and monitor overall site conditions and drilling equipment. One or more designated health physics (HP) technicians will conduct field-screening for radioisotopes. The boreholes will be logged and sampled by Tom Tharp, Michael Wade, Rarilee Conway, or some other designated geologist.

The technician will conduct soil and/or ground water sampling, fill out chain-of-custody (COC) forms, perform health and safety monitoring, obtain field sampling equipment and sample jars, deliver samples to the Sample Management Office (SMO), log lithologies, and conduct any other related field work. The technician also will provide field-screening for VOCs with a Photoionization detector (PID) or, if short-chained hydrocarbons are thought to be present, a Flame ionization detector (FID) (i.e., sample equipment, core, etc.). Tom Tharp and/or Michael Wade also will assist with sampling activities. Sandia will provide an Industrial Hygienist (IH) technician and an health physicist (HP) technician to monitor drilling and sampling equipment, soil and samples, and overall field conditions (i.e., temperature, cold stress, weather, etc.) for health and safety concerns. At the CWL and RWL, the HP will be available for the first 30 to 50 ft of drilling vertical (i.e., the primary zone of potential contamination). The HP will let the field team know when it is no longer necessary for continued radiation field-screening and/or upscaled personnel protective equipment. Potential project personnel and their phone numbers are listed in workplan HASP.

If any laboratory questions arise regarding sample containers, sample quantity, holding times, etc., the following people will be contacted from the field to reduce time and receive immediate technical advice:

Bob Friberg or a Sample Coordinator at TMA/Eberline (or Jim Lozito): 505-345-3461.
Ellen LaRiviere, Quanterra (previously ENSECO): 303-421-6611.

Mike Gonzalez, Sandia SMO (848-0404).

Samples collected for VOCs, semi-volatile organic compounds (SVOCs), HE compounds, total cyanide, and/or Target Analyte List (TAL) metals will be submitted to Quanterra in Colorado unless otherwise notified. Radiological samples (total uranium, tritium, and photon emitters (gamma spectroscopy) will be submitted to TMA/Eberline in Albuquerque. In addition, soil will be collected in a plastic marinelli beaker and screened by Amir Monagheghi at the Health Physics Laboratory, Department 7715 (Radiation Protection Measurements Department) for radiological screening, but ONLY in areas where potential radioisotopes may be encountered (i.e., Building 935, CWL, and the RWL only). These samples will be collected at every interval where soil samples are collected for pre-laboratory screening purposes. Equipment rinse blanks also will be collected at various times in the field, such as after completing a borehole, and will be submitted to the analytical laboratories. The frequency of collecting equipment blanks will be determined in the field by the sampling team but will be at least once pre borehole.

The historical backgrounds for the ER sites associated with this project are available on request. The HASP provides additional information concerning potential contaminants of concern at each site. Details of the Phase I SAPs for each ER site are presented below.

Phase I Drilling and Soil Sampling

Phase I activities involve drilling 25 boreholes from 30 to 135 ft deep at several locations within TA-II. These activities are described separately below. Because of ongoing activities at TA-II, drilling during the weekend may be necessary at the CWL and RWL. This is to avoid the potential for shrapnel and debris striking the drill rig (or Tom Tharp and Michael Wade) during TA-II testing activities. However, the drilling activities will be conducted primarily during weekdays and no other weekend field activities are planned.

Schedule for Phase I drilling activities at TA-II beginning Tuesday, November 1, 1994. Please note that the schedule may change due to potential activities at TA-II and/or any access problems.

Field Activity Dates (Estimated)	Borehole	Location
Tuesday, November 1, 1994	TA2-BH-11	Drill 50-ft borehole west of Buildings 915 and 922 - septic leachfield area; non-ER site; BTEX in soil vapor.
Wednesday, November 2	TA2-BH-08	Drill 50-ft borehole west of Building 907; septic leachfield area.
Thursday, November 3	TA2-BH-06	Drill 50-ft borehole west of Building 904; septic leachfield area.
Friday, November 4	TA2-BH-10	Drill 100-ft borehole southwest of Building 913; power line for night lighting shut-off for day; drilling at high TCE soil vapor location. Must complete this in one day.
Saturday, November 5	TA2-BH-09 (935) and TA2-BH-16 (907)	Drill 2 boreholes today - power shut off at 8 am (back on by 6 pm). Drill 30-ft borehole east of Building 935 at TCE soil vapor spot; drill 50-ft borehole north of Building 920 at Building 907 HE catch basin. Must finish both today due to power shut off in the area - weekend only.
Sunday, November 6	TA2-BH-17 and TA2-BH-18 (both at Building 940)	Drill 2 boreholes today - Both will be 50-ft deep near the Building 940 septic tank and drywell areas. Must complete these today due to power shutoff in the area - weekend only.
Monday, November 7	NO Drilling	NO Drilling - Day off.
Tuesday, November 8	TA2-BH-07	Drill 50-ft borehole along Building 904 HE Drain Trench immediately east of Buildings 914/917.
Wednesday, November 9	TA2-BH-12	Drill 50-ft borehole east of Building 919 - eastern portion of TA-II but will not interfere with testing activities.
Thursday, November 10	TA2-BH-13	Drill 50-ft borehole east of Building 919 - eastern portion of TA-II but will not interfere with testing activities.
Friday, November 11, 1994	End Phase I Drilling	Any site cleanup; drill rig decon at TA-III decontamination pad, if necessary.

Please Note: All drill rod and sampling equipment decontamination will take place at each drilling site. The drilling operation will have a mobile decontamination vehicle and augers and split-spoon samplers will be steam-cleaned at each site. The decontamination water tank will be drained into 55-gallon drums and labeled as IDW until analytical results are received for each site. All work will be performed in Level D protection, but Level C equipment will be on-hand, if required. Please refer to the TA-II site-specific workplan, sampling and analysis plan, and/or waste management plan for more details about these activities.

The estimated schedule for Phase I drilling at TA-II is as follows, and assumes that no major drill rig or health and safety issues occur during fieldwork. In addition, the schedule assumes that a minimum of one 50-ft deep borehole will be drilled and sampled each day. If the drilling contractor has at least 150 ft of hollow stem augers

available, drill rig decontamination can be performed every few days (unless decontamination is conducted at each site each day).

If time and budget permit, a third moniter well will be installed in the vicinity of the northern apex of TA-II, near Buildings 915 and 922. Assuming 10 days to well completion, the estimated dates of drilling will be from Wednesday, February 1 through about February 15 (includes decontamination and demob time).

Field activity schedules may change depending on testing activities and/or security issues at TA-II, the availability of drill rigs, and schedule conflicts during the holiday season. Field work may be completed well ahead of schedule if TA-II testing activities don't affect drilling activities. Detailed SAP tables and brief descriptions of activities planned for each site are described separately below. In addition, the following sections describe field-screening methods and other activities that apply to most of the sites in general.

All drilling equipment and drill cuttings will be field-screened for VOCs with a PID or FID and/or for radioisotopes using alpha scintillation and G-M probes. If any potential COCs are identified above background levels, samples will be collected and submitted for analysis. Samples will be submitted for off-site analysis for QA/QC (i.e., duplicates and Matrix Spike/Matrix Spike Duplicate [MS/MSD], etc.). All samples will be preserved on ice, inlcuding tritium (but not other radioisotope analyses unless if it easier to do so for transporting purposes). The drilling geologist may collect additional soil samples in more permeable zones or submit more samples for QA/QC analysis if determined necessary in the field. In addition, ground water samples may be collected from any perched water-bearing zone(s) encountered during drilling, although perched ground water is not expected at the shallow depths planned for Phase I drilling. Samples will be collected, submitted, and analyzed for the potential COCs as listed in the tables in the following sections. To minimize the potential for cross-contamination, all sampling equipment will be decontaminated according to ER Operating Procedures (FOP) 94-57 (i.e., a mixture of water and Alconox soap followed by deionized water). Each borehole will be backfilled with grout after it has been drilled to the total depth.

All tritium samples will be collected in 16 oz. glass jars or plastic bottles as preferred by TMA/Eberline. Any samples collected for isotopic uranium and/or plutonium

will be collected with the tritium and submitted for all three analyses as per TMA. This will reduce sample containers, filling out COCs, and sample collection time. In addition, other samples sent to Quanterra can be combined into one liner. For example, SVOCs, HE compounds, and TAL metals analyses can all be collected into one 2-inch diameter by 6-inch long stainless steel liner and submitted as such to the lab.

In general, all soil samples will be collected in a driven split-spoon sampler (typically a 2-in. diameter) lined with stainless steel liners. The liners will then be sealed with Teflon sheets, plastic end caps, and inert duct tape. The samples will then be labeled with the appropriate I.D. (i.e., borehole number and depth) and placed on ice. Collecting samples in liners via split-spoons also was performed during TA-II drilling during March and June 1994 and at the Kauai Test Facility site in April. This is the best technical method to collect undisturbed samples, especially for VOCs and SVOCs. Although noted in the tables in the following sections, the preferred liner size and appropriate analyses for soil are as follows (as per Quanterra and TMA/Eberline):

Analysis	Minimum Stainless Steel Liner Length (inches)[a]	Minimum Glass Sample Jar Size
VOCs	3	---
Total Cyanide	3	---
TAL metals, HE compounds, and SVOCs	6	---
TAL metals, HE compounds, and Total Cyanide	6	---
Tritium[b]	---	250 ml
Gamma spectroscopy and total uranium	---	500 ml
PCBs, SVOCs, and HE compounds	6	---
Tritium, isotopic uranium, and isotopic plutonium	---	500 ml plastic or glass jar (16 oz.)

a - The stainless steel liners are typically 3 inches or 6 inches long and 2 inches in diameter.
b - Liquid scintillation counter method.

NOTE: Miranelli beakers will be collected for radiological screening at each interval where samples are collected for gamma spectroscopy and/or total uranium at RMMA sites only.

The tritium samples and any other radiological samples can be collected in the split-spoon sampler and pushed into a jar/bottle since volatilization is not an issue or collected directly from a non-lined split-spoon sampler. In addition, most of the septic system ER sites will only require collecting VOCs and SVOCs in the first 15 to 20 ft to confirm the results of the passive SVSs. Therefore, there will be more sample material for the other analyses.

Unless contaminated soil and/or water is encountered during drilling activities, no additional soil samples will be collected during drilling. The field team has the discretion to collect additional samples at any time during these activities. The analytical results from samples collected during drilling activities will be used for waste characterization.

The following sections present the SAPs for each Phase I site and include sampling and analysis tables for all field activities.

All aqueous samples (including equipment blanks) will be sent to an off-site laboratory. For equipment blank (EB) and other aqueous samples, the following minimum quantities of water and bottle types/sizes have been requested by the analytical laboratories (Quanterra; TMA) (RCRA analytical holding times in parentheses):

TAL Metals	One 500 ml poly. bottle with nitric preservative (180 days)
HE Compounds	Two 1-liter amber glass bottles (7 days)
SVOCs	Two 1-liter amber glass bottles (7 days)
VOCs	Three 40 ml VOAs (14 days)
Total Cyanide	One 8 ounce poly. bottle (14 days)
Mercury	One 250 ml glass bottle (preferred) with sodium hydroxide preservative (13 days in plastic bottle; 28 days in glass bottle)
Tritium	One 1-liter amber glass bottle (none)

Building 904

Two boreholes (TA2-BH-06 and TA2-BH-07) will be drilled in the vicinity of Building 904 (see figure). Borehole TA2-BH-06 will be drilled adjacent to the septic system leachfield; borehole TA2-BH-07 will be drilled along the former HE drain

trench. Both boreholes will be drilled with a hollow stem auger drill rig and samples will be collected with a split-spoon sampler. The lithology will be described from drill cuttings and split-spoon samples.

At borehole TA2-BH-06 (leachfield), soil samples will be collected for analysis at the following depth intervals: 5, 10, 15, 20, 30, 40, and 50 ft. As listed in detail in Table 1a, the soil samples will be analyzed for SVOCs, total cyanide, high explosives, gamma spectroscopy, TAL metals, tritium, and VOCs. No VOCs or SVOCs were identified from the passive SVS investigation in the leachfield area. However, limited confirmatory sampling will be done for VOCs between 5 and 20 ft and SVOCs between 10 and 20 ft.

At borehole TA2-BH-07 (drain trench), soil samples will be collected for analysis at the following depth intervals: 5, 10, 15, 20, 30, 40, and 50 ft. As listed in detail in Table 1b, the soil samples will be analyzed for SVOCs, total cyanide, high explosives, gamma spectroscopy, TAL metals, tritium, and VOCs. Limited confirmatory sampling will be done for VOCs between 5 and 20 ft and SVOCs between 10 and 20 ft.

Building 907

Two boreholes (TA2-BH-08 and TA2-BH-09) will be drilled in the vicinity of Building 907 (see attached figures). Borehole TA2-BH-08 will be drilled adjacent to the septic system leachfield; borehole TA2-BH-09 will be drilled near the HE catch box. Both boreholes will be drilled with a hollow stem auger drill rig and samples will be collected with a split-spoon sampler. The lithology will be described from drill cuttings and split-spoon samples.

At borehole TA2-BH-08, soil samples will be collected for analysis at the following depth intervals: 5, 10, 15, 20, 30, 40, and 50 ft. As listed in detail in Table 2a, the soil samples will be analyzed for SVOCs, total cyanide, high explosives, gamma spectroscopy, TAL metals, tritium, and VOCs. No VOCs or SVOCs were identified from the passive SVS investigation in the leachfield area. Limited confirmatory sampling will be done for VOCs and SVOCs between 5 and 15 ft and 10 and 20 ft, respectively.

At borehole TA2-BH-09, soil samples will be collected for analysis at the following depth intervals: 5, 10, 15, 20, 30, 40, and 50 ft. As listed in detail in Table 2b, the soil samples will be analyzed for SVOCs, total cyanide, high explosives, gamma spectroscopy, TAL metals, tritium, and VOCs.

Building 913

This location has been selected based on the results of a passive SVS. The SVS investigation identified TCE in soil vapor south-southwest of Building 913. This area is **not** designated as an ER site. One borehole (TA2-BH-10) will be drilled at the location of the highest TCE soil vapor point (see figure). The borehole will be drilled with a hollow stem auger drill rig and samples will be collected with a split-spoon sampler. The lithology will be described from drill cuttings and split-spoon samples.

Soil samples will be collected for analysis at the following depth intervals: 5, 10, 15, 20, 30, 40, 50, 75, and 100 ft. As listed in detail in Table 3, the soil samples will be analyzed for SVOCs, TAL metals, tritium, and VOCs. No SVOCs were identified from the passive SVS investigation. However, soil samples will be collected and analyzed for SVOCs at 10, 15, and 20 ft. In addition, soil samples will be collected from selected depths and analyzed for VOCs by EPA Methods 8010 and 8020.

Building 915/922

One borehole (TA2-BH-11) will be drilled in the vicinity west of Buildings 915 and 922. The borehole will be drilled adjacent to the septic system leachfield area (see attached figure). The borehole will be drilled with a hollow stem auger drill rig and samples will be collected with a split-spoon sampler. The lithology will be described from drill cuttings and split-spoon samples.

At borehole TA2-BH-11, soil samples will be collected for analysis at the following depth intervals: 5, 10, 15, 20, 30, 40, and 50 ft. As listed in detail in Table 4, the soil samples will be analyzed for SVOCs, high explosives, gamma spectroscopy, TAL metals, tritium, and VOCs. No SVOCs were identified from the passive SVS investigation in the leachfield area. However, limited confirmatory sampling will be done for SVOCs between 10 and 20 ft.

Building 919

Two boreholes (TA2-BH-12 and TA2-BH-13) will be drilled in the vicinity east of Building 919. Each borehole will be drilled in the septic system leachfield area (see figure. Both boreholes will be drilled with a hollow stem auger drill rig and samples will be collected with a split-spoon sampler. The lithology will be described from drill cuttings and split-spoon samples.

At each borehole, soil samples will be collected for analysis at the following depth intervals: 5, 10, 15, 20, 30, 40, and 50 ft. As listed in detail in Table 5, the soil samples will be analyzed for high explosives, gamma spectroscopy, TAL metals, tritium, and VOCs. No VOCs or SVOCs were identified from the passive SVS investigation in the leachfield area. However, limited confirmatory sampling will be done for VOCs between 5 and 15 ft.

Building 935

Three boreholes (TA2-BH-14, TA2-BH-15, and TA2-BH-16) will be drilled in the vicinity of Building 935. Borehole TA2-BH-14 will be drilled adjacent to the septic tank; borehole TA2-BH-15 will be drilled southwest of the former retention tank and dry well (see attached figure); and borehole TA2-BH-16 will be drilled southeast of Building 935 in the vicinity of high TCE concentrations in soil vapor. All three boreholes will be drilled with a hollow stem auger drill rig, two 50 ft deep and one to 30 ft deep (TA2-BH-16). Soil samples will be collected with a split-spoon sampler, and the lithology will be described from drill cuttings and split-spoon samples.

At boreholes TA2-BH-14 and TA2-BH-15 (Table 6a for both boreholes), soil samples will be collected for analysis at the following depth intervals: 5, 10, 15, 20, 30, 40, and 50 ft. As listed in detail in Table 6a, the soil samples will be analyzed for gamma spectroscopy, TAL metals, and tritium. No VOCs or SVOCs were identified from the passive SVS investigation in the leachfield area and confirmatory samples were collected during drilling activities in March 1994. These two boreholes are located within the Building 935 ER site and RMMA boundaries. Therefore, drilling will begin in Level C protection to at least 30 ft. The decision for downgrading from Level C to Level D protection will be decided by an HP.

At borehole TA2-BH-16, soil samples will be collected at the following depth intervals: 5, 10, 15, 20, and 30 (Table 6b). The samples will only be analyzed for VOCs by EPA Methods 8010 and 8020. Borehole TA2-BH-16 is located east of Building 935 and is not within the Building 935 ER site or the RMMA boundary.

Building 940

Two boreholes (TA2-BH-17 and TA2-BH-18) will be drilled in the vicinity of Building 940. Borehole TA2-BH-17 will be drilled adjacent to the septic tank near the northwest side of the building. Borehole TA2-BH-18 will be drilled near the dry well southwest of the building. Both boreholes will be drilled with a hollow stem auger drill rig to 50 ft deep. Soil samples will be collected with a split-spoon sampler, and the lithology will be described from drill cuttings and split-spoon samples.

At both borehole locations, soil samples will be collected for analysis at the following depth intervals: 5, 10, 15, 20, 30, 40, and 50 ft. As listed in Table 7, the soil samples will be analyzed for HE compounds, gamma spectroscopy, TAL metals, tritium, and VOCs. No VOCs were identified from the passive SVS investigation in the leachfield area. However, limited confirmatory sampling will be done for VOCs between 5 and 15 ft.

Radioactive Waste Landfill

Five boreholes (TA2-BH-19 through TA2-BH-23) will be drilled in the vicinity of the Radioactive Waste Landfill (RWL). Except for borehole TA2-BH-19, boreholes TA2-BH-20 through TA2-BH-23 will be angled.

Borehole TA2-BH-19 will be drilled to a depth of 30 ft in the location of a Chemical Disposal Pit (CDP) identified from historical air-photos. The CDP is located outside the northwest corner of the RWL. Although the borehole location is outside the RWL (an RMMA site), all drilling activities will be conducted as if it is an RMMA site. The borehole will be drilled with a hollow stem auger drill rig. Soil samples will be collected with a split-spoon sampler, and the lithology will be described from drill cuttings and split-spoon samples. At this borehole, soil samples will be

collected for analysis at the following depth intervals: 5, 10, 15, 20, and 30 ft. As listed in Table 8a, the soil samples will be analyzed for VOCs (confirmatory), gamma spectroscopy, TAL metals, isotopic uranium, and tritium.

The four angled boreholes will be drilled beneath trench and/or pit locations within the RWL. Each borehole however will be drilled from a minimum of 10 ft outside the RWL. Table RWL-1 shows the angles, lateral and vertical distances, and the total depth of each proposed borehole. The actual lengths of the angled boreholes range from 55 to 140 ft.

Table RWL-1. Approximate depths and angles for boreholes planned to be drilled beneath the RWL. Depths and/or angles may change depending on field conditions and sampling requirements.

Borehole Number	Angle (approximate degrees from vertical)	Lateral Distance (Approximate range in ft)	Total Length of Borehole (ft) (Approximate)	Total Depth (ft BGL) (Approximate)
TA2-BH-20	40	35	55	41
TA2-BH-21	45	40	55	40
TA2-BH-22	45	80	100	80
TA2-BH-23	45	80-100	100-140	80-95

At each of the four angled borehole locations soil samples will be collected for analysis at several depth intervals (see Tables 8b through 8e). In general, the soil samples will be analyzed for VOCs (confirmatory at some locations only), gamma spectroscopy, TAL metals, tritium, isotopic uranium, and isotopic plutonium.

Classified Waste Landfill

Seven boreholes (TA2-BH-24 through TA2-BH-30) will be drilled in the vicinity of the Classified Waste Landfill (CWL); two of these boreholes (TA2-BH-29 and TA2-BH-30) will be angled.

Boreholes TA2-BH-24 through 28 each will be drilled 50 ft deep adjacent to four ACF pits and one ACF cut-and-fill trench. The ACF pits are reportedly 6 ft in diameter by 30 ft in depth; the cut-and-fill trench is 6-ft wide by 10-ft long by 12-ft deep. Each of these five boreholes will be drilled with a hollow stem auger drill rig to 50-ft deep. Soil samples will be collected with a split-spoon sampler, and the lithology will be

described from drill cuttings and split-spoon samples. At each of these five boreholes, soil samples will be collected for analysis at the following depth intervals: 5, 10, 15, 20, 30, 40, and 50 ft. As listed in Table 9a, the soil samples will be analyzed for HE compounds, SVOCs, isotopic uranium, gamma spectroscopy, TAL metals, tritium, PCBs, and VOCs. TCE, PCE, and BTEX were identified from the passive SVS investigations previously conducted in the CWL. However, two boreholes have already been drilled at the location of the two SVS "hot spots" and no VOCs were identified above detection limits. Limited confirmatory sampling will be done for VOCs at each of these boreholes.

The two angled boreholes will be drilled beneath trench locations within the CWL. One angled borehole (TA2-BH-30) will be drilled beneath a series of east-west oriented trenches (see Table CWL-1 below). This borehole will be drilled at an angle of 40 degrees from vertical to about 95 ft BGL (see Table CWL-1 below). The total length of the drilled borehole will be 125 ft. The other angled borehole (TA2-BH-29) will be drilled beneath a former pit and trench area (see attached Figure). This borehole will be drilled at about 40 degrees from vertical to about 60 ft BGL. The total length of the borehole will be about 75 ft.

Table CWL-1. Approximate depths and angles for boreholes planned to be drilled in the CWL. Depths and/or angles may change depending on field conditions and sampling requirements.

Borehole Number	Angle (degrees from vertical)	Lateral Distance (ft)	Total Length of Borehole (ft)	Total Depth (ft BGL)
TA2-BH-29	40	50	75	60
TA2-BH-30	40	95-100 ft	125	95

At each of the two angled borehole locations, soil samples will be collected for analysis at several depth intervals (see Tables 9b and 9c). In general, the soil samples will be analyzed for VOCs, gamma spectroscopy, TAL metals, tritium, isotopic uranium, PCBs, SVOCs, and HE compounds.

Workplan SAP Tables for Technical Area 2

The following SAP tables are for drilling and sampling activities to be conducted from October 1994 through about January 1995 at TA-2. Please note that five boreholes planned to be drilled at the CWL ACF pits have only one sampling and analysis table since the table will apply the same to all 5 boreholes (TA2-BH-24 through -28).

Table 1a. Summary of analyses for soil samples to be collected from borehole TA2-BH-06 drilled near the septic system leachfield west of Building 904, Technical Area 2.

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	Tritium[b]	SVOCs[c]	TAL Metals[d]	HE[e]	Total Cyanide	Gamma Spec	Total # o Containe
Subsurface soil	5	1	1	---	---	---	1	1	4
Subsurface soil	10	1	1	1	1	1	1	1	5
Subsurface soil	15	1	1	1	1	1	1	1	5
Subsurface soil	20	---	1	1	1	1	1	1	4
MS/MSD - Include on COC	30	---	---	---	---	---	---	---	---
Subsurface soil	30	---	1	---	1	---	1	1	4
Subsurface soil	40	---	1	---	1	---	1	1	4
Subsurface soil	50	---	1	---	1	---	1	1	4
Total Analyses 36	---	3	7	3	6	3	7	7	30 Total Containe

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - Liquid scintillation counter method. Tritium will be collected in a split-spoon sampler and transferred into a 250 ml glass jar.
c - EPA Method 8270.
d - EPA Methods 6010 and 7000.
e - EPA Method 8330.

NOTE: <u>This is NOT an RMMA site.</u>
Note: SVOCs, High Explosives (HE), and TAL Metals samples will be collected into one 6-in. liner.
Note: A VOC and SVOC trip blank will be prepared and submitted for this borehole.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: All soil samples should be labeled as TA2-BH-06-depth.
Note: No soil will be collected from this borehole for a miranelli beaker.
Note: Equipment blanks will be collected after reaching the total depth of the borehole. The samples will be labeled as TA2-BH-06-EB. These samples should be collected in either a 2.5 liter amber glass jar or in a 1 liter bottle for SVOCs, HE, and TAL metals, and a 40 ml VOA for VOC samples.

Table 1b. Summary of analyses for soil samples to be collected from borehole TA2-BH-07 drilled in the vicinity of the former HE drain trench along the east side of Building 904, Technical Area 2.

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	Tritium[b]	SVOCs[c]	TAL Metals[d]	HE[e]	Total Cyanide	Gamma Spec	Total # o Containe
Subsurface soil	5	1	1	---	---	---	1	1	4
Subsurface soil	10	1	1	1	1	1	1	1	5
Subsurface soil	15	1	1	1	1	1	1	1	5
Subsurface soil	20	---	1	1	1	1	1	1	4
MS/MSD - Include on COC	30	---	---	---	---	---	---	---	---
Subsurface soil	30	---	1	---	1	1	1	1	4
Subsurface soil	40	---	1	---	1	1	1	1	4
Subsurface soil	50	---	1	---	1	1	1	1	4
Total Analyses 39	---	3	7	3	6	6	7	7	30 Total Containe

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - Liquid scintillation counter method. Tritium will be collected in a split-spoon sampler and transferred into a 250 ml glass jar.
c - EPA Method 8270.
d - EPA Methods 6010 and 7000.
e - EPA Method 8330.

NOTE: This is NOT an RMMA site.
Note: SVOCs, High Explosives, and TAL Metals samples will be collected into one 6-in. liner.
Note: A VOC and SVOC trip blank will be prepared and submitted for this borehole.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: All soil samples should be labeled as TA2-BH-07-depth.
Note: No soil will be collected from this borehole for a miranelli beaker.
Note: Equipment blanks will be collected after the total depth of the borehole has been drilled. The samples will be labeled as TA2-BH-07-EB. The samples should be collected in either a 2.5 liter amber glass jar or in a 1 liter bottle for SVOCs, HE, and TAL metals, and a 40 ml VOA for VOC samples.

Table 2a. Summary of analyses for soil samples to be collected from borehole TA2-BH-08 drilled near the septic system leachfield southwest of Building 907, Technical Area 2.

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	Tritium[b]	SVOCs[c]	TAL Metals[d]	HE[e]	Total Cyanide	Gamma Spec	Total # o Containe
Subsurface soil	5	1	1	---	---	---	1	1	4
Subsurface soil	10	1	1	1	1	1	1	1	5
Subsurface soil	15	1	1	1	1	1	1	1	5
Subsurface soil	20	---	1	1	1	1	1	1	4
MS/MSD - Include on COC	30	---	---	---	---	---	---	---	---
Subsurface soil	30	---	1	---	1	---	1	1	4
Subsurface soil	40	---	1	---	1	---	1	1	4
Subsurface soil	50	---	1	---	1	---	1	1	4
Total Analyses 36	---	3	7	3	6	3	7	7	30 Total Containe

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - Liquid scintillation counter method. Tritium will be collected in a split-spoon sampler and transferred into a 250 ml glass jar.
c - EPA Method 8270.
d - EPA Methods 6010 and 7000.
e - EPA Method 8330.

NOTE: This is NOT an RMMA site.
Note: SVOCs, High Explosives, and TAL Metals samples will be collected into one 6-in. liner.
Note: A VOC and SVOC trip blank will be prepared and submitted for this borehole.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: All soil samples should be labeled as TA2-BH-08-depth.
Note: No soil will be collected from this borehole for a miranelli beaker.
Note: Equipment blanks will be collected after the total depth of the borehole has been reached. The samples will be labeled as TA2-BH-08-EB, and should be collected in either a 2.5 liter amber glass jar or in a 1 liter bottle for SVOCs, HE, and TAL metals. A 40 ml VOA will be used for VOC samples.

Table 2b. Summary of analyses for soil samples to be collected from borehole TA2-BH-09 drilled near the HE catch box along the HE drain trench south of Building 907, Technical Area 2.

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	Tritium[b]	SVOCs[c]	TAL Metals[d]	HE[e]	Total Cyanide	Gamma Spec	Total # o Containe
Subsurface soil	5	1	1	---	---	---	1	1	4
Subsurface soil	10	1	1	1	1	1	1	1	5
Subsurface soil	15	1	1	1	1	1	1	1	5
Subsurface soil	20	---	1	1	1	1	1	1	4
MS/MSD - Include on COC	30	---	---	---	---	---	---	---	---
Subsurface soil	30	---	1	---	1	1	1	1	4
Subsurface soil	40	---	1	---	1	1	1	1	4
Subsurface soil	50	---	1	---	1	1	1	1	4
Total Analyses 39	---	3	7	3	6	6	7	7	30 Total Containe

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - Liquid scintillation counter method. Tritium will be collected in a split-spoon sampler and transferred into a 250 ml glass jar.
c - EPA Method 8270.
d - EPA Methods 6010 and 7000.
e - EPA Method 8330.

NOTE: This is NOT an RMMA site.
Note: SVOCs, High Explosives, and TAL Metals samples will be collected into one 6-in. liner.
Note: A VOC and SVOC trip blank will be prepared and submitted for this borehole.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: All soil samples should be labeled as TA2-BH-09-depth.
Note: No soil will be collected from this borehole for a miranelli beaker.
Note: Equipment blanks will be collected after the total depth of the borehole has been reached. The samples will be labeled as TA2-BH-09-EB, and should be collected in either a 2.5 liter amber glass jar or in a 1 liter bottle for SVOCs, HE, and TAL metals. A 40 ml VOA will be used for VOC samples.

Table 3. Summary of analyses for soil samples to be collected from borehole TA2-BH-10 drilled south-southwest of Building 913, Technical Area 2.

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	Tritium[b]	SVOCs[c]	TAL Metals[d]	Total number of containers
Subsurface soil	5	1	1	---	---	2
Subsurface soil	10	1	1	1	1	3
Subsurface soil	10[e]	1[e]	---	---	---	1
Subsurface soil	15	1	1	1	1	3
Subsurface soil	20[e]	1[e]	---	---	---	1
Subsurface soil	20	1	1	1	1	3
MS/MSD - Include on COC	30	---	---	---	---	---
Subsurface soil	30	1	1	---	---	2
Subsurface soil	40[e]	1[e]	---	---	---	1
Subsurface soil	40	1	1	---	---	2
Subsurface soil	50	1	1	---	---	2
Subsurface soil	75	1	1	---	---	2
Subsurface soil	100[e]	1[e]	---	---	---	1
Subsurface soil	100	1	1	---	---	2
Total Analyses 28	---	13	9	3	3	25 total containers

a - EPA Methods 8010/8020. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - Liquid scintillation counter method. Tritium will be collected in a split-spoon sampler and transferred into a 250 ml glass jar.
c - EPA Method 8270.
d - EPA Methods 6010 and 7000.
e - EPA Method 8240.

NOTE: This is NOT an RMMA or an ER site.
NOTE: SVOCs and TAL Metals samples will both be collected in one 6-in. liner.
NOTE: A VOC and SVOC field blank will be prepared and submitted for this borehole.
NOTE: All soil samples should be preserved on ice unless otherwise noted.
NOTE: All soil samples should be labeled as TA2-BH-10-depth.
NOTE: No soil will be collected from this borehole for a miranelli beaker.
Note: Equipment blanks will be collected after the total depth of the borehole has been reached. The samples will be labeled as TA2-BH-10-EB, and should be collected in either a 2.5 liter amber glass jar or in a 1 liter bottle for SVOCs and TAL metals. A 40 ml VOA will be used for VOC samples.

Table 4. Summary of analyses for soil samples to be collected from borehole TA2-BH-11 drilled near the septic system leachfield southwest of Building 915/northwest of Building 922, Technical Area 2.

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	Tritium[b]	SVOCs[c]	TAL Metals[d]	HE[e]	Gamma Spec	Total # of Containers
Subsurface soil	5	1	1	---	---	---	1	3
Subsurface soil	10	1	1	1	1	1	1	4
Subsurface soil	15	1	1	1	1	1	1	4
Subsurface soil	20	1	1	1	1	1	1	4
MS/MSD - Include on COC	30	---	---	---	---	---	---	---
Subsurface soil	30	1	1	---	1	1	1	4
Subsurface soil	40	1	1	---	1	1	1	4
Subsurface soil	50	1	1	---	1	1	1	4
Total Analyses 36	---	7	7	3	6	6	7	27 Total Containers

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - Liquid scintillation counter method. Tritium will be collected in a split-spoon sampler and transferred into a 250 ml glass jar.
c - EPA Method 8270.
d - EPA Methods 6010 and 7000.
e - EPA Method 8330.

NOTE: This is NOT an RMMA site.
Note: SVOCs, High Explosives, and TAL Metals samples will be collected into one 6-in. liner.
Note: A VOC and SVOC trip blank will be prepared and submitted for this borehole.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: All soil samples should be labeled as TA2-BH-11-depth.
Note: No soil will be collected from this borehole for a miranelli beaker.
Note: Equipment blanks will be collected after the total depth of the borehole has been reached. The samples will be labeled as TA2-BH-11-EB, and should be collected in either a 2.5 liter amber glass jar or in a 1 liter bottle for SVOCs, HE, and TAL metals. A 40 ml VOA will be used for VOC samples.

Table 5. Summary of analyses for soil samples to be collected from boreholes TA2-BH-12 and TA2-BH-13 drilled in the septic system leachfield area east of Building 919, Technical Area 2. This table will be used for analyses at both boreholes.

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	Tritium[b]	TAL Metals[c]	HE[d]	Gamma Spec	Total # of Containers
Subsurface soil	5	1	1	---	---	1	4
Subsurface soil	10	1	1	1	1	1	5
Subsurface soil	15	1	1	1	1	1	5
Subsurface soil	20	---	1	1	1	1	4
MS/MSD - Include on COC	30	---	---	---	---	---	---
Subsurface soil	30	---	1	1	---	1	4
Subsurface soil	40	---	1	1	---	1	4
Subsurface soil	50	---	1	1	---	1	4
Total Analyses 36	---	3	7	6	6	7	30 Total Containers

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - Liquid scintillation counter method. Tritium will be collected in a split-spoon sampler and transferred into a 250 ml glass jar.
c - EPA Methods 6010 and 7000.
d - EPA Method 8330.

NOTE: This is NOT an RMMA site.
Note: High Explosives (HE) and TAL Metals samples will be collected into one 6-in. liner.
Note: A VOC trip blank will be prepared and submitted for this borehole.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: All soil samples should be labeled as TA2-BH-12-depth (or TA2-BH-13-depth).
Note: No soil will be collected from this borehole for a miranelli beaker.
Note: Equipment blanks will be collected after the total depth of the borehole has been reached. The samples will be labeled as TA2-BH-12-EB (or -13-EB), and should be collected in either a 2.5 liter amber glass jar or in a 1 liter bottle for SVOCs, HE, and TAL metals. A 40 ml VOA will be used for VOC samples.

Table 6a. Summary of analyses for soil samples to be collected from boreholes TA2-BH-14 and TA2-BH-15 drilled adjacent to the septic tank southeast of Building 935, Technical Area 2. This table will be used for analyses at both boreholes.

Sample Type or QA/QC Type	Sample Depth (in ft)	Tritium[a]	TAL Metals[b]	Gamma Spec	Total # of Containers
Subsurface soil	5	1	---	1	3
Subsurface soil	10	1	1	1	3
Subsurface soil	15	1	1	1	3
Subsurface soil	20	1	1	1	3
MS/MSD - Include on COC	30	---	---	---	---
Subsurface soil	30	1	1	1	3
Subsurface soil	40	1	1	1	3
Subsurface soil	50	1	1	1	3
Total Analyses 20	---	7	6	7	20 Total Containers

a - Liquid scintillation counter method. Tritium will be collected in a split-spoon sampler and transferred into a 250 ml glass jar.

b- EPA Methods 6010 and 7000.

NOTE: <u>This IS an RMMA site.</u>

Note: TAL Metals samples will be collected into one 6-in. liner.

Note: All soil samples should be preserved on ice unless otherwise noted.

Note: All soil samples should be labeled as TA2-BH-14-depth.

Note: Soil samples will be collected from this borehole at each sample location for a miranelli beaker and analyzed by Department 7715.

Note: Equipment blanks will be collected after the total depth of the borehole has been reached. The samples will be labeled as TA2-BH-14-EB, and should be collected in either a 2.5 liter amber glass jar or in a 1 liter bottle for TAL metals. A 40 ml VOA will be used for VOC samples.

Table 6b. Summary of analyses for soil samples to be collected from borehole TA2-BH-16 drilled in a soil vapor TCE "hot spot" east of Building 935, Technical Area 2.

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs by EPA Methods 8010 and 8020	Total # of Containers
Subsurface soil	5	1	1
Subsurface soil	10	1	1
Subsurface soil	15	1	1
Subsurface soil	20	1	1
MS/MSD - Include on COC	30	---	---
Subsurface soil	30	1	1
Total Analyses 5	---	5	5 Total Containers

NOTE: This is NOT an RMMA or an ER site.

Note: Each sample will be collected into one 3-in. liner for each depth interval and the analyses labeled as 8010/8020.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: A VOC field blank will be should be prepared for this borehole.
Note: All soil samples should be labeled as TA2-BH-16-depth.
Note: Soil samples will be collected from this borehole at each sample location for a miranelli beaker and analyzed by Department 7715.
Note: Equipment blanks will be collected after the total depth of the borehole has been reached. The samples will be labeled as TA2-BH-16-EB. A 40 ml VOA will be used for VOC samples.

Table 7. Summary of analyses for soil samples to be collected from boreholes TA2-BH-17 and TA2-BH-18 drilled near the septic tank on the west side of Building 940, Technical Area 2. This table will be used for both boreholes TA2-BH-17 and TA2-BH-18.

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	Tritium[b]	TAL Metals[c]	HE[d]	Gamma Spec	Total # of Containers
Subsurface soil	5	1	1	---	---	1	3
Subsurface soil	10	1	1	1	1	1	4
Subsurface soil	15	1	1	1	1	1	4
Subsurface soil	20	---	1	1	1	1	3
MS/MSD - Include on COC	30	---	---	---	---	---	---
Subsurface soil	30	---	1	1	1	1	3
Subsurface soil	40	---	1	1	1	1	3
Subsurface soil	50	---	1	1	1	1	3
Total Analyses 29	---	3	7	6	6	7	23 Total Containers

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - Liquid scintillation counter method. Tritium will be collected in a split-spoon sampler and transferred into a 250 ml glass jar.
c - EPA Methods 6010 and 7000.
d - EPA Method 8330.

NOTE: This is NOT an RMMA site.
Note: High Explosives (HE) and TAL Metals samples will be collected into one 6-in. liner.
Note: A VOC trip blank will be prepared and submitted for this borehole.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: All soil samples should be labeled as TA2-BH-17-depth and/or TA2-BH-18-depth
Note: No soil will be collected from this borehole for a miranelli beaker.
Note: Equipment blanks will be collected after the borehole has been drilled to the total depth of about 50 ft. These samples will be labeled as TA2-BH-17-EB (or -18-EB) and should be collected in either a 2.5 liter amber glass jar or in a 1 liter bottle for TAL metals and a 40 ml VOA for VOC samples.

Table 8a. Summary of analyses for soil samples to be collected from angled borehole TA2-BH-19 drilled in the former Chemical Disposal Pit located near the Radioactive Waste Landfill, Technical Area 2.

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	Tritium[b]	Isotopic Uranium	gamma spec	TAL Metals[c]	Total # of Containers
Subsurface soil	5	1	1	1	1	1	4
Subsurface soil	10	1	1	1	1	1	4
Subsurface soil	15	1	1	1	1	1	4
MS/MSD - Include on COC	15	---	---	---	---	---	---
Subsurface soil	20	---	1	1	1	1	3
Subsurface soil	30	---	1	1	1	1	3
Total Analyses 23	---	3	5	5	5	5	18 Total Containers

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - Liquid scintillation counter method. Tritium will be collected in a split-spoon sampler and transferred into a 500 ml glass jar or plastic bottle and analyzed with isotopic uranium.
c - EPA Methods 6010 and 7000.

NOTE: This is located outside the RWL and is not an RMMA site. However, the site will be considered as an RMMA site during this drilling event.
Note: TAL Metals samples will be collected into one 6-in. liner.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: All soil samples should be labeled as TA2-BH-19-depth.
Note: Gamma spectroscopy samples will be collected from this borehole in a miranelli beaker.
Note: Equipment blanks will be collected after the borehole has been drilled to the total depth of 30 ft. These samples will be labeled as TA2-BH-19-EB and should be collected in either a 2.5 liter amber glass jar or in a 1 liter bottle for TAL metals and a 40 ml VOA for VOC samples.

Table 8b. Summary of analyses for soil samples to be collected from angled borehole TA2-BH-20 drilled beneath Pit 1 at the Radioactive Waste Landfill, Technical Area 2. Approximate angle is 40 degrees from vertical and 55 ft deep (41 ft BGL). Borehole will be drilled 10 ft from the RWL fence.

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	TAL Metals[b]	Tritium[c]	Isotopic Plutonium	Isotopic Uranium	Gamma Spec	Total # of Containers
Subsurface soil	20	1	1	1	1	1	1	4
Subsurface soil	30	1	1	1	1	1	1	4
MS/MSD - Include on COC	30	---	---	---	---	---	---	---
Subsurface soil	40	---	1	1	1	1	1	3
Subsurface soil	50	---	1	1	1	1	1	3
Total Analyses 22	---	2	4	4	4	4	4	14 Total Containers

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - EPA Methods 6010 and 7000.
c - Liquid scintillation counter method for tritium. Tritium will be collected in a split-spoon sampler and transferred into a 500 ml glass jar or plastic bottle and analyzed with isotopic uranium and plutonium.

NOTE: This IS an RMMA site (although the drill rig and sampling will be conducted outside of the RWL).
Note: TAL Metals samples will be collected into one 6-in. liner.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: All soil samples should be labeled as TA2-BH-20-depth.
Note: Tritium, isotopic uranium and isotopic plutonium all will be collected into one 500 ml plastic or glass jar.
Note: Equipment blanks will be collected after the borehole has been drilled to the total depth. These samples will be labeled as TA2-BH-20-EB and should be collected in a 2.5 liter amber glass jar or in a 1 liter bottle for TAL metals and a 40 ml VOA for VOC samples.

Table 8c. Summary of analyses for soil samples to be collected from angled borehole TA2-BH-21 drilled beneath Pit 2 at the Radioactive Waste Landfill, Technical Area 2. Approximate angle is 45 degrees from vertical and 55 ft deep (40 ft BGL). Borehole will be drilled 10 ft from the RWL fence.

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	TAL Metals[b]	Tritium[c]	Isotopic Plutonium	Isotopic Uranium	Gamma Spec	Total # of Containers
Subsurface soil	20	1	1	1	1	1	1	4
Subsurface soil	30	1	1	1	1	1	1	4
MS/MSD - Include on COC	30	---	---	---	---	---	---	3
Subsurface soil	40	---	1	1	1	1	1	---
Subsurface soil	50	---	1	1	1	1	1	3
Total Analyses 22	---	2	4	4	4	4	4	14 Total Containers

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - EPA Methods 6010 and 7000.
c - Liquid scintillation counter method for tritium. Tritium will be collected in a split-spoon sampler and transferred into a 500 ml glass jar or plastic bottle and analyzed with isotopic uranium and plutonium.

NOTE: This IS an RMMA site.
Note: TAL Metals samples will be collected into one 6-in. liner.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: All soil samples should be labeled as TA2-BH-21-depth.
Note: Tritium, isotopic uranium, and isotopic plutonium all will be collected into one 500 ml plastic bottle or glass jar.
Note: Equipment blanks will be collected after the borehole has been drilled to the total depth. These samples will be labeled as TA2-BH-21-EB and should be collected in a 2.5 liter amber glass jar or in a 1 liter bottle for TAL metals and a 40 ml VOA for VOC samples.

Table 8d. Summary of analyses for soil samples to be collected from angled borehole TA2-BH-22 drilled beneath Trench 5 at the Radioactive Waste Landfill, Technical Area 2. Approximate angle is 45 degrees from vertical and 100 ft deep (80 ft BGL). Borehole will be drilled 10 ft from the RWL fence.

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	TAL Metals[b]	Tritium[c]	Isotopic Plutonium	Isotopic Uranium	Gamma Spec	Total # of Containers
Subsurface soil	30	1	1	1	1	1	1	4
Subsurface soil	40	1	1	1	1	1	1	4
MS/MSD - Include on COC	40	---	---	---	---	---	---	---
Subsurface soil	50	---	1	1	1	1	1	3
Subsurface soil	60	---	1	1	1	1	1	3
Subsurface soil	70	---	1	1	1	1	1	3
Subsurface soil	85	---	1	1	1	1	1	3
Subsurface soil	100	---	1	1	1	1	1	3
Total Analyses 37	---	2	7	7	7	7	7	23 Total Containers

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - EPA Methods 6010 and 7000.
c - Liquid scintillation counter method for tritium. Tritium will be collected in a split-spoon sampler and transferred into a 500 ml glass or plastic jar and analyzed with isotopic uranium and plutonium.

NOTE: <u>This IS an RMMA site.</u>
Note: TAL Metals samples will be collected into one 6-in. liner.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: All soil samples should be labeled as TA2-BH-22-depth.
Note: Tritium, isotopic uranium, and isotopic plutonium all will be collected into one 500 ml plastic bottle or glass jar.
Note: Equipment blanks will be collected after the borehole has been drilled to the total depth. These samples will be labeled as TA2-BH-22-EB and should be collected in a 2.5 liter amber glass jar or in a 1 liter bottle for TAL metals and a 40 ml VOA for VOC samples.

Table 8e. Summary of analyses for soil samples to be collected from angled borehole TA2-BH-23 drilled beneath Trench 6 at the Radioactive Waste Landfill, Technical Area 2. Approximate angle is 45 degrees from vertical at a maximum of 135 ft deep and a minimum of 100 ft deep (i.e., 80 ft and 95 BGL, respectively).

Sample Type or QA/QC Type	Sample Depth (in ft)	TAL Metals[a]	Tritium[b]	Isotopic Plutonium	Isotopic Uranium	Gamma Spec	Total # of Containers
Subsurface soil	30	1	1	1	1	1	3
Subsurface soil	40	1	1	1	1	1	3
MS/MSD - Include on COC	40	---	---	---	---	---	---
Subsurface soil	55	1	1	1	1	1	3
Subsurface soil	70	1	1	1	1	1	3
Subsurface soil	85	1	1	1	1	1	3
Subsurface soil	100	1	1	1	1	1	3
Subsurface soil	120	1	1	1	1	1	3
Subsurface soil	135	1	1	1	1	1	3
Total Analyses 40	---	8	8	8	8	8	24 Total Containers

a - EPA Methods 6010 and 7000.

b- Liquid scintillation counter method for tritium. Tritium will be collected in a split-spoon sampler and transferred into a 500 ml glass jar or plastic bottle along with isotopic uranium and plutonium.

NOTE: This IS an RMMA site.

Note: Minimum length of borehole will be about 100 ft; maximum depth (if no auger refusal) will be 135 ft.

Note: TAL Metals samples will be collected into one 6-in. liner.

Note: All soil samples should be preserved on ice unless otherwise noted.

Note: All soil samples should be labeled as TA2-BH-23-depth.

Note: Tritium, isotopic uranium, and isotopic plutonium all will be collected into a 500 ml plastic bottle or glass jar.

Note: Equipment blanks will be collected after the borehole has been drilled to the total depth. These samples will be labeled as TA2-BH-23-EB and should be collected in a 2.5 liter amber glass jar or in a 1 liter bottle for TAL metals.

Table 9a. Summary of analyses for soil samples to be collected from five 50-ft deep boreholes planned to be drilled adjacent to the ACF pits in the Classified Waste Landfill, Technical Area 2. The five boreholes are TA2-BH-24, -25, -26, -27, and -28. *(NOTE to SMO: this table will be applied to all five ACF boreholes; therefore, for the number of analyses and containers, multiply by 5. Also, multiply by 5 for containers/analyses for equipment and trip blanks).*

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	TAL Metals[b]	SVOCs[c]	HE	PCBs	Iso. U	Tritium	Gamma Spec	Total # of Containers
Subsurface soil	5	1	1	1	1	1	1	1	1	5
Subsurface soil	10	1	1	1	1	1	1	1	1	5
Subsurface soil	15	1	1	1	1	1	1	1	1	5
MS/MSD - Include on COC	15	---	---	---	---	---	---	---	---	---
Subsurface soil	20	---	1	1	1	1	1	1	1	4
Subsurface soil	30	---	1	1	1	1	1	1	1	4
Subsurface soil	40	---	1	1	1	1	1	1	1	4
Subsurface soil	50	---	1	1	1	1	1	1	1	4
Total Analyses 52	---	3	7	7	7	7	7	7	7	**31 Total Containers**

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - EPA Methods 6010 and 7000.
c - Liquid scintillation counter method for tritium. Tritium will be collected in a split-spoon sampler and transferred into a 500 ml glass jar or plastic bottle along with isotopic uranium and plutonium.

NOTE: <u>This is NOT an RMMA site.</u>
Note: TAL Metals, SVOCs, and HE compound samples all will be collected into one 6-in. liner.
Note: PCBs will be collected into one 3-inch liner.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: Tritium and isotopic uranium will be collected into one 500 ml glass jar or plastic bottle.
Note: All soil samples should be labeled as TA2-BH-23-depth.
Note: Tritium, isotopic uranium, and isotopic plutonium all will be collected into a 500 ml plastic bottle or glass jar.
Note: Equipment blanks will be collected after the borehole has been drilled to the total depth. These samples will be labeled as TA2-BH-24-EB and should be collected in a 2.5 liter amber glass jar or in a 1 liter bottle for TAL metals and a 40 ml VOA for VOC samples (Subsequent ACF boreholes should be labeled as -25-EB; -26-EB; -27-EB; and -28-EB).

Table 9b. Summary of analyses for soil samples to be collected from angled borehole TA2-BH-29 drilled beneath pits and trenches at the Classified Waste Landfill, Technical Area 2. Approximate angle is 40 degrees from vertical and about 75 ft long (60 ft BGL).

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	TAL Metals[b]	SVOCs[c]	HE	PCBs	Iso. U	Tritium	Gamma Spec	Total # of Containers
Subsurface soil	20	1	1	1	1	1	1	1	1	5
Subsurface soil	30	1	1	1	1	1	1	1	1	5
Subsurface soil	40	1	1	1	1	1	1	1	1	5
MS/MSD - Include on COC	40	---	---	---	---	---	---	---	---	---
Subsurface soil	50	1	1	1	1	1	1	1	1	5
Subsurface soil	60	1	1	1	1	1	1	1	1	5
Subsurface soil	70	1	1	1	1	1	1	1	1	5
Total Analyses 48	---	6	6	6	6	6	6	6	6	30 Total Containers

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - EPA Methods 6010 and 7000.
c - Liquid scintillation counter method for tritium. Tritium will be collected in a split-spoon sampler and transferred into a 500 ml glass jar or plastic bottle along with isotopic uranium.

NOTE: Drilling and sampling will probably be conducted in Level C protection until decided otherwise by the HP and SSO.
Note: TAL Metals, SVOCs, and HE compound samples all will be collected into one 6-in. liner.
Note: PCBs will be collected into one 3-inch liner.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: Tritium and isotopic uranium will be collected into one 500 ml glass jar or plastic bottle.
Note: All soil samples should be labeled as TA2-BH-29-depth.
Note: Tritium and isotopic uranium all will be collected into a 500 ml plastic bottle or glass jar.
Note: Equipment blanks will be collected after the borehole has been drilled to the total depth. These samples will be labeled as TA2-BH-29-EB and should be collected in a 2.5 liter amber glass jar or in a 1 liter bottle for TAL metals and a 40 ml VOA for VOC samples.

Table 9c. Summary of analyses for soil samples to be collected from angled borehole TA2-BH-30 drilled beneath pits and trenches at the Classified Waste Landfill, Technical Area 2. Approximate angle is 40 degrees from vertical and 125 ft long (95 ft BGL).

Sample Type or QA/QC Type	Sample Depth (in ft)	VOCs[a]	TAL Metals[b]	SVOCs[c]	HE	PCBs	Iso. U	Tritium	Gamma Spec	Total # of Containers
Subsurface soil	30	1	1	1	1	1	1	1	1	5
Subsurface soil	45	1	1	1	1	1	1	1	1	5
Subsurface soil	60	1	1	1	1	1	1	1	1	5
MS/MSD - Include on COC	60	---	---	---	---	---	---	---	---	---
Subsurface soil	75	1	1	1	1	1	1	1	1	5
Subsurface soil	90	1	1	1	1	1	1	1	1	5
Subsurface soil	115	1	1	1	1	1	1	1	1	5
Subsurface soil	125	1	1	1	1	1	1	1	1	5
Total Analyses 52	---	7	7	7	7	7	7	7	7	**35 Total Containers**

a - EPA Method 8240. VOCs will be collected in 2-in. diameter by 3-in. long stainless steel liners.
b - EPA Methods 6010 and 7000.
c - Liquid scintillation counter method for tritium. Tritium will be collected in a split-spoon sampler and transferred into a 500 ml glass jar or plastic bottle along with isotopic uranium.

NOTE: Drilling and sampling will probably be conducted in Level C protection until decided otherwise by the HP and SSO.
Note: TAL Metals, SVOCs, and HE compound samples all will be collected into one 6-in. liner.
Note: PCBs will be collected into one 3-inch liner.
Note: All soil samples should be preserved on ice unless otherwise noted.
Note: Tritium and isotopic uranium will be collected into one 500 ml glass jar or plastic bottle.
Note: All soil samples should be labeled as TA2-BH-30-depth.
Note: Tritium and isotopic uranium all will be collected into a 500 ml plastic bottle or glass jar.
Note: Equipment blanks will be collected after the borehole has been drilled to the total depth. These samples will be labeled as TA2-BH-30-EB and should be collected in a 2.5 liter amber glass jar or in a 1 liter bottle for TAL metals and a 40 ml VOA for VOC samples.